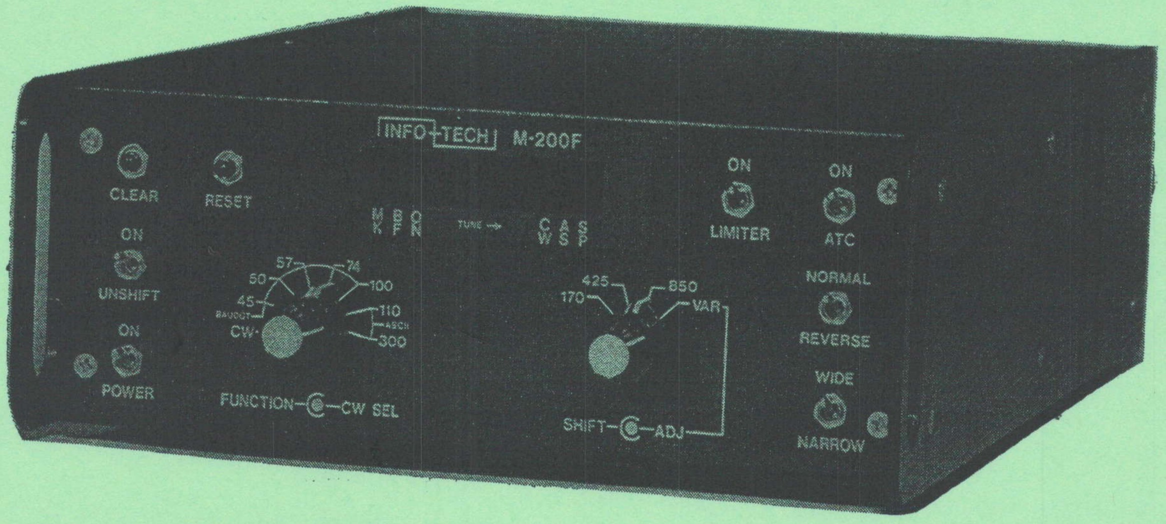
Owner's Manual

INFO-TECH M-200F

DECODER



INFO-TECH ELECTRONIC EQUIPMENT

Digital Electronic Systems, Inc.

Englewood, FL 33533

INFO-TECH M-200F

OPERATING MANUAL

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R/A TTL: (J3-12) TTL level output from demodulator

R/A Loop: (Loop B) (J3-11,14)
HV isolated keying circuit for 20 or 60 ma loop
+200v VDC max spacing (non conducting)
+ 80 ma marking (conducting)

Regenerated Outputs: (outputs from the Microprocessor which can be either ASCII or Baudot, as selected by user).

Loop A: (J3-5&8) 20 or 60ma fully isolated mode as selected.

TTL: (J3-9) TTL level (mark= +5v space= 0v)

RS232: (J3-15) RS232 level of mode as selected
(mark= -12v space= +12v)

Autostart: (J3-6)
High voltage keying transistor, non isolated, open collector
+200 VDC Max non conducting
+100 Ma Max conducting

Other Outputs:

A. Audio Output- (J3-13) regenerated C.W. audio for use with a small, external 8-150 ohm speaker as a tuning aid.

B. Scope- (J3-2,3) output impedance 100k ohm 10v peak to peak max for mark and space indication.

CONNECTIONS:

Power: Make sure the voltage selector switch on the rear panel is in the proper position for the voltage in your area, then connect the unit to a properly grounded receptable.
Note: Defeating the chassis ground provision in the power cord will void the warranty.

Input: Connect the audio line, from the receiver to be used, to the "input" jack. The receiver audio output may come from the speaker, line output, phone patch output, recorder output, earphone output or any audio output delivering at least 1.1v p-p audio.

Video: Connect the "video" output of the M200-F to the video monitor to be used. This signal is composite video information (video signal plus horizontal and vertical sync). It is not RF modulated and may NOT be connected to the antenna.
Note: For conversion of TV sets for use as video monitors refer to addendum 1 of this manual.

Note: The three connections described above are the minimum connections required for the normal basic operation of the M-200F as a Tri Mode code to video converter. The remainder of the connections are for auxillary or optional functions.

Morse Aux:(J3-1) This Input/Output is provided primarily as an input to monitor local Morse transmissions from a keyboard such as Info-Tech M-300 series. To utilize this input as such, simply connect a cord between this pin and the 'Morse Mon' jack of the keyboard. When connected in this manner the M200-F will automatically display outgoing Morse transmissions provided that there is no conflicting signal at the Audio input to the M200F.

Note: This input may also be connected to a hand keyer with "dry contact" or "open collector" output for testing or code practive. The "Morse Aux" may also be used as the output of the Morse front end tone decoder.

R/A Aux:(J3-4) This input/output is provided primarily as an input to monitor local RTTY transmissions from an Info-Tech keyboard (M-300 series). This input may be connected to the R/A Mon Jack on the 300 using a suitable patch cord. When connected in this manner the 200F will automatically display the signals generated by the M300 keyboard.

Note: The R/A Aux may also be used as a digital input to the microprocessor for use with an external demodulator.

Loop B: (J3-14= +, J3-11= -) This output provides a fully isolated current loop driver for operation of a teleprinter. This output is directly from the demodulator and provides no regeneration or conversion and will operate a printer properly only when demodulating a signal of the same code and speed as the printer. For typical hookup see figure 1.

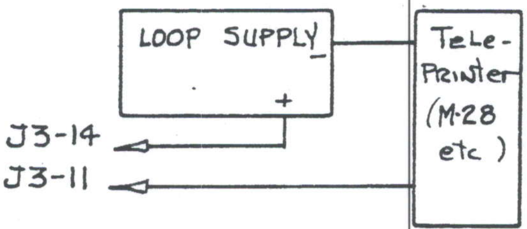


Fig. 1 Hookup of Loop "B"

R/A TTL: (J3-12) This output provides a TTL level from the internal demodulator (mark= +5 space= 0) for optional use.

Audio Output: (J3-13) This output provides a low level audio output for the drive of a small (2") 8 ohm speaker. On Morse operation the output of the speaker gives a regenerated output of the received Morse signal and aids in Morse tuning. The speaker is not furnished with the 200F.

See figure 2 for hookup.

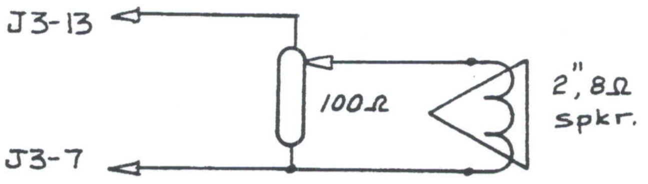


Fig. 2 Aux Speaker Hook up

Autostart Driver: (J3-6) This output provides DC switching for an autostart relay. For hookup see figure 3.

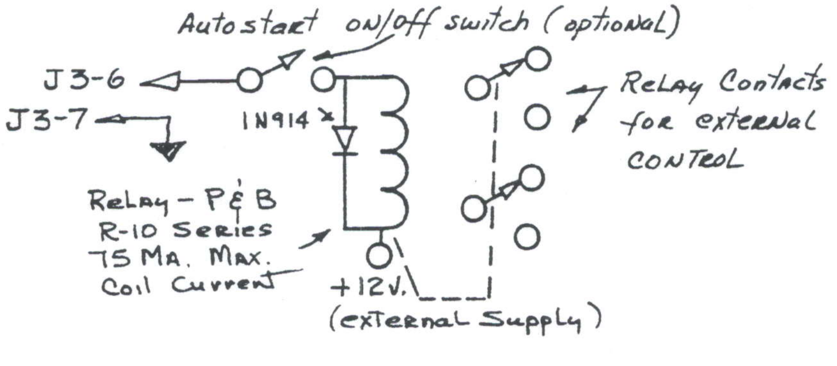

Autostart on/off switch (optional)
J3-6
J3-7
1N914
Relay Contacts for external control
Relay - P&B R-10 Series 75 MA. Max. Coil Current
+12V.
(external supply)

Fig. 3 Suggested Autostart Wiring

Scope: (J3-2 mark) (J-3 space) These outputs provide a high impedance output of the demodulator for use in driving an oscilloscope as a RTTY tuning device.

For hookup see figure 4.

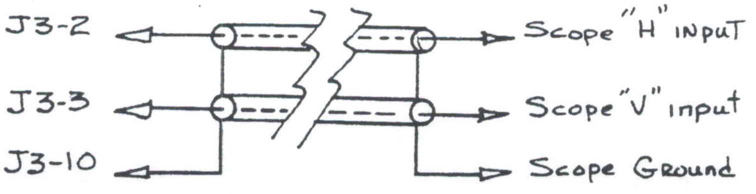


Fig. 4 Scope Hook up

Loop A: (J3-8=+, J3-5= -) This output provides a fully isolated current loop driver for operation of either an ASCII or Baudot teleprinter. This output is fully regenerated and its mode (ASCII or Baudot) is determined by the position of SWB9.

Note that regardless of the incoming code (Morse, RTTY, or ASCII) the output to this regenerated loop will be whatever is selected by the user.

Note: See figure 12 for proper selection of the baud rate for the printer selected.

For hookup of Loop A see figure 5.

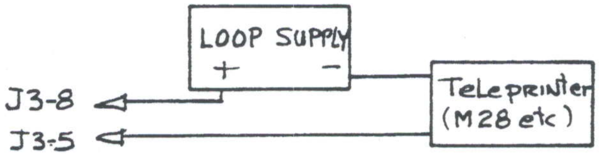


Fig. 5 Hookup of Loop "A"

Regenerated TTL:(J3-9) This output provides TTL level signals of the same signal provided at loop A. For optional use. (mark +3, 5v space +0.8v)

RS 232:(J3-15)This output provides the RS 232 level signals (mark = -12v space= +12v) of the same regenerated signal provided at loop   For use in driving printers etc. that require RS 232 levels. For hookup see figure 6.

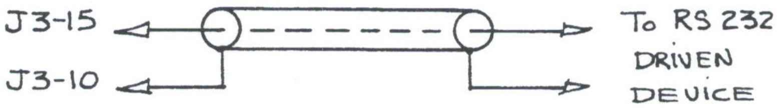
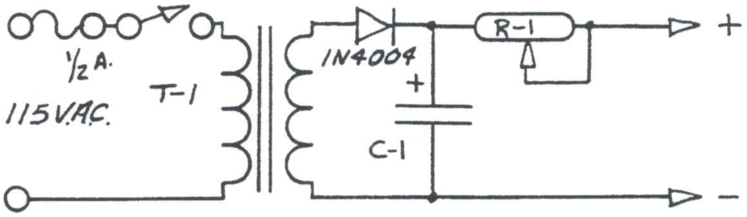


Fig. 6 RS-232 Hookup

Note: Schematics of typical loop supplies are shown in figure 7.



For 60 MA. Loop T-1=	Signal 241-5-120	R-1=2k,20 watts
	Triad N-48X	C-1=40mfd@250v
	Stancor P6411	
For 20MA. Loop T-1=	Triad F70X	R-1=1k 4 watts
	Stancor P83-91	C-1=100mfd@30v.
	Signal 241-5-24	

Fig. 7 Typical Loop Supply

OPERATING CONTROLS:

Power: Controls AC power to converter.

Reset: Pressing the "reset" button resets the logic board microprocessor to initialize the operation of the converter. It is necessary to press the "reset" button when switching into or out of the "Morse" mode.

Holding down the "reset" button (RTTY or ASCII modes only) until the display scrolls one line will cause the unit to "read" the incoming RTTY or ASCII speed and indicate the baud rate on the screen, after a short delay.

Mode Switch: (SW-C) Determines the mode of operation and the speeds within that mode. Note that the RTTY speeds are listed in bauds rather than words per min. (Figure 8 is a chart that converts bauds to wpm).

Baud	WPM
45	60
50	66
57	75
74	100
100	130

Figure 8

C W Sel: (R-12) (center of mode switch)
This potiometer adjusts the bandwidth of the Morse "front end" for help in tuning out desired signals.

Clear: clears the video display from the screen. (on release of button)

Unshift: (SW-M) (unshift on space)
When this switch is on and the Mode switch is an a RTTY (Baudot) mode, the converter will automatically be set to "letters" case whenever a "space" character is received.

Limiter: (SW-G)
When the "limiter" switch is on, the input amplifier to the converter provides hard limiting to minimize the effects of fading.

A.T.C.: (Automatic Threshold Control)
When this switch is on the detector and switching circuits in the demodulator automatically compensate for bias errors caused by unbalanced tuning of the mark and space tones. This control may also be used for "mark only" or "space only" reception of RTTY (Baudot) and ASCII.

Normal/Reverse: (SW-J)
This switch provides a means of inverting the signal output from the demodulator. When receiving FSK RTTY it is possible to have the mark tone tuned to the space active filter and vice versa. This switch will allow the mark and space channels to be effectively reversed so that a signal on the mark channel will produce a spacing output and a signal on the space channel will provide a marking output when in the "reverse" position.

Wide/Narrow Switch: (SW-H)

Allows a change in switching threshold to effectively control the bandwidth of the active filters in the demodulator. (RTTY/ASCII only)

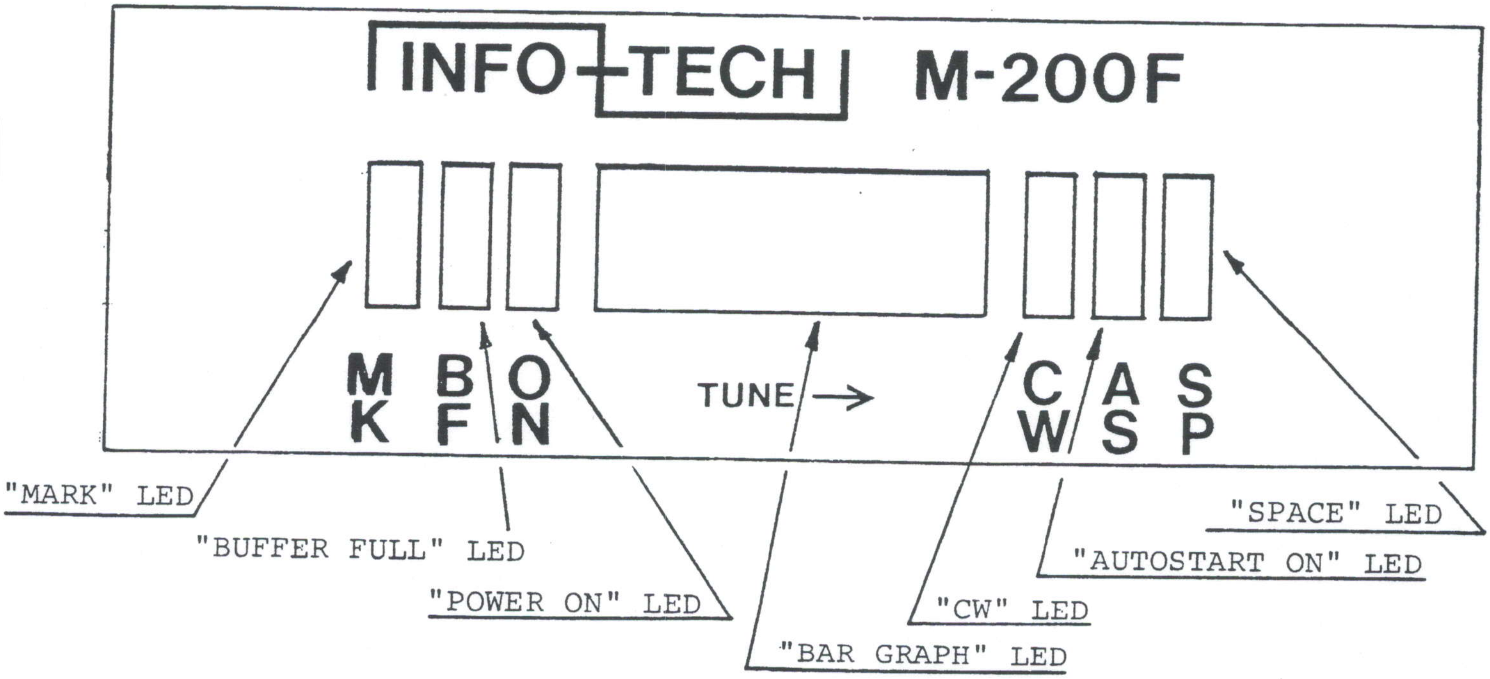
Shift Switch: (SW-D)

This switch selects the desired RTTY or ASCII frequency shifts. Either 850hz, 425hz, 170hz or a variable shift (approximately 85 to 675hz) is selected with the "Var" control which is concentrically mounted with the shift switch.

Indicators:

An array of L.E.D's has been placed on the front panel as aids in tuning and/or operation.
Figure 10 illustrates their location.

FIGURE 10. Indicator Array



Mark & Space LED's: (MK & SP)

These indicators are used in conjunction with the Bar Graph LED unit to properly tune a RTTY signal.
Proper tuning of a RTTY signal is indicated by both the mark and space LED's flashing while the Bar Graph LED deflects more than halfway to the right (as in an analog meter).

"C W" L.E.D.: When a CW signal is properly tuned, this indicator will appear to be synchronized to the incoming tones and in addition the bar graph is used as a "peaking" meter to allow more precise tuning.

"AS" L.E.D.:
Indicates when the autostart function is operating.

"ON" L.E.D.:
Indicates when power is on the M200F.

Buffer full indicator: (BF)
A small amount of buffer (40 characters) is available in the microprocessor for first-in-first out storage of the serial data for the regenerated,hard copy, outputs. This allows a slower printer to be used in conjunction with higher incoming speeds.

If however the higher incoming speeds exceeds the baud rate of the printer, garbled printing will result. When the buffer light does come on you have an indication of overflow and thus garble.
In everyday use, a 110 baud ASCII or 75 Baud Baudot machine will seldom have a problem of overflow.

Bar Graph LED: As array of 10 LED's arranged as an "analog" meter. In all modes, proper tuning is indicated by the maximum deflection, to the right, of the display.
The very fast response exhibited by this bar graph indicator enables the operator to tune to the "peak" easier than if he were to use a conventional, damped, analog meter.

Morse Operation:
To receive morse signals, turn the mode selector switch to CW, the CW sel control at midrange and press the reset button. Tune the receiver (also set for receiving CW) to a known CW station that is sending good code. It is suggested that the Marine stations such as WCC (13,032.KC) be used as a "learning station" as they are always on the air and send high quality code. Adjust the BFO or clarifier control on your receiver to produce a beat note of 1KC. When the beat note is synchronized with the Morse front end, the Morse LED (figure 10) will flash in unison with the incoming code, also if a speaker is hooked to the audio line of J3, (figure 2), you will hear the regenerated audio when the receiver is properly tuned.
You may then decrease the bandwidth of the Morse front end by tuning the CW sel control counter clockwise until the desired selectivity is achieved.
Should your receiver not be able to produce a 1KC beat note, you may adjust the front end to a different frequency by adjusting R7 as directed in the alignment section. Practice tuning in stations under less crowded band conditions before you attempt some of the situations that exist in the amateur bands.

Remember to keep sufficient audio level to the M-200F. The limiter switch is usually ON during morse operation except in the case of extreme QRM.

Remember also that a loss of signal output may be caused by a drifting receiver, transmitter, or both.

RTTY/ASCII OPERATION:

Proper RTTY reception requires that three conditions be met; First, the received mark and space tones must match the frequency of the active filters in the demodulator. Second, the RTTY speed being received must be the same as the speed to which the converter is set. The last requirement is that the received tones be of the correct polarity.

To assist in tuning the received tones to match the demodulator active filters, two LED indicators and a solid state tuning meter have been provided. Figure 11A through E shows the relationship of the mark and space tones to the demodulator's active filter response and the corresponding indication of the LEDs and tuning indicator.

Set the 'mode' switch to one of the five Baudot speeds, (45,50,57,75 or 100 baud) or to the ASCII 110 or 300 position, and press the 'reset' button. Tune the receiver connected to the 200-F input to a RTTY station.

Adjust the receiver tuning BFO to increase the frequency of the received tones until the second point is reached that results in a meter indication and Mark LED flashing. Set the 'shift' selector switch to the position that causes both 'Mark' and 'Space' LEDs to flash. This should also result in a higher and/or steadier indication on the 'meter'.

After the correct shift has been determined and set, sligltly re-adjust the receiver BFO for maximum indication on the tuning indicator. If both tones are correctly tuned, both Mark and Space LEDs should be alternately flashing brightly and the tuning 'meter' will give a high steady reading. If the mark or space tone only is correctly tuned, only one LED will light brightly and there will be a wide and rapid fluctuation in the tuning indicator.

If a high and steady tuning indication is not obtainable the received RTTY shift may be other than the three standard shifts provided in the M-200F. These signals may be received by tuning the receiver for the highest meter indication which produces the least meter fluctuation, and if necessary switching the ATC circuit on. The ATC circuit will allow signals with weak meter readings to be printed. While the ATC circuit will allow the converter to print on a single tone only (Mark or Space only) performance will be greatly enhanced, especially on weak or noisy signals, by tuning the maximum signal, rather than tuning a single tone and activating the ATC.

If the received RTTY speed is unknown, it may be determined by a trial and error method of setting the 'Mode' switch to each of the Baudot and ASCII positions with the 'Normal/Reverse' switch in the Normal and then Reverse position until the combination that produces correct copy on the display is found.

As an alternative to this method, the M-200F has a feature that allows it to sample the incoming speed, and display that speed on the video screen. To activate this speed readout feature the 'Reset' button must be held down until the display scrolls (moves up one line). When this is done, the video display and digital output will stop (even though there is still a signal input to the converter) while the speed is being sampled. If the converter continues to print, the speed readout function has not been activated, and another attempt should be made to activate it.

After the delay while the input is being sampled, the speed of the incoming signal will be printed on the video monitor, and printer if used, at the left hand margin, and the converter will then resume normal printing operation. The speed that is printed corresponds to the speed in Baud of the received signal for the five recognized RTTY (Baudot) and 2 ASCII speeds.

The delay associated with the speed readout sampling is not a direct function of time, but rather of the number of valid measurable data pulses. Not all signals input to the M-200F are measurable. Since the sampling makes its speed determination on the width of individual data bits, both marking and spacing, some characters, such as 'blank' or 'letters' do not have signal level transitions necessary to isolate and measure a single data bit's length.

Only after the required number of valid and Measurable data pulses have been received will the converter print the signal speed. If this delay becomes excessive, or if for any reason it becomes necessary or desirable to terminate the incoming signal sampling, this may be done by pressing the 'reset' button briefly and normal operation will be resumed.

The sampling delay may become excessive if the signal is not properly tuned, if characters containing sampleable data bits are not sent, or sent infrequently, if the sending station suffers from excessive keyboard distortion, or if the speed being received is not very close to one of the five speeds that the M-200F will recognize and print.

Because of the different sampling methods used for the speed readout and normal printing, the converter may print many signals for which it will not display a speed readout. The speed readout sampling measures data pulse widths, and is very critical on speed and keyboard distortion, and to a certain extent receiver tuning. The normal printing operation on the other hand uses center bit sampling, where a small portion of the center of each data bit is sampled to determine the state of that bit.

After the correct speed has been determined and set by the Mode switch, either the normal or reverse position of the 'Normal/Reverse' switch should provide correct copy of the received signal. On rapid data signals (tapes or automatic senders) this normal/reverse determination is best done by trial and error.

For slow sending (medium to slow hand typing) the normal/reverse decision can also be made by observing which of the LEDs are illuminated during the idle time between characters. If the Mark LED is on during this time, the switch should be in the 'Normal' position. If the space LED is on during the idle time, then the switch should be in the 'Reverse' position.

Variable Tuning (VAR): Operation

Should none of the three fixed shifts seem to tune in the signal properly you may wish to use the "VAR" position of the shift switch.

This channel again uses the fixed mark filter of 2125Hz (1275Hz; lo tone set) and a space active filter that allows the user to tune any space frequency in the 2000 to 3000Hz range. (1200 to 2200Hz, lo tone set).

The operation is the same as in the fixed channel operation in that the operator tunes his receiver so that the mark channel is properly tuned starting with the "VAR" control in the fully clockwise position, the operator tunes the VAR control in a counterclockwise direction until a full bright flicker of the space LED is showing and the tuning "meter" has a maximum deflection to the right. This allows for the reception of the Newer, standard, shifts used by the commercial and military services and better reception of amateurs transmitting shifts that have drifted from the norm.

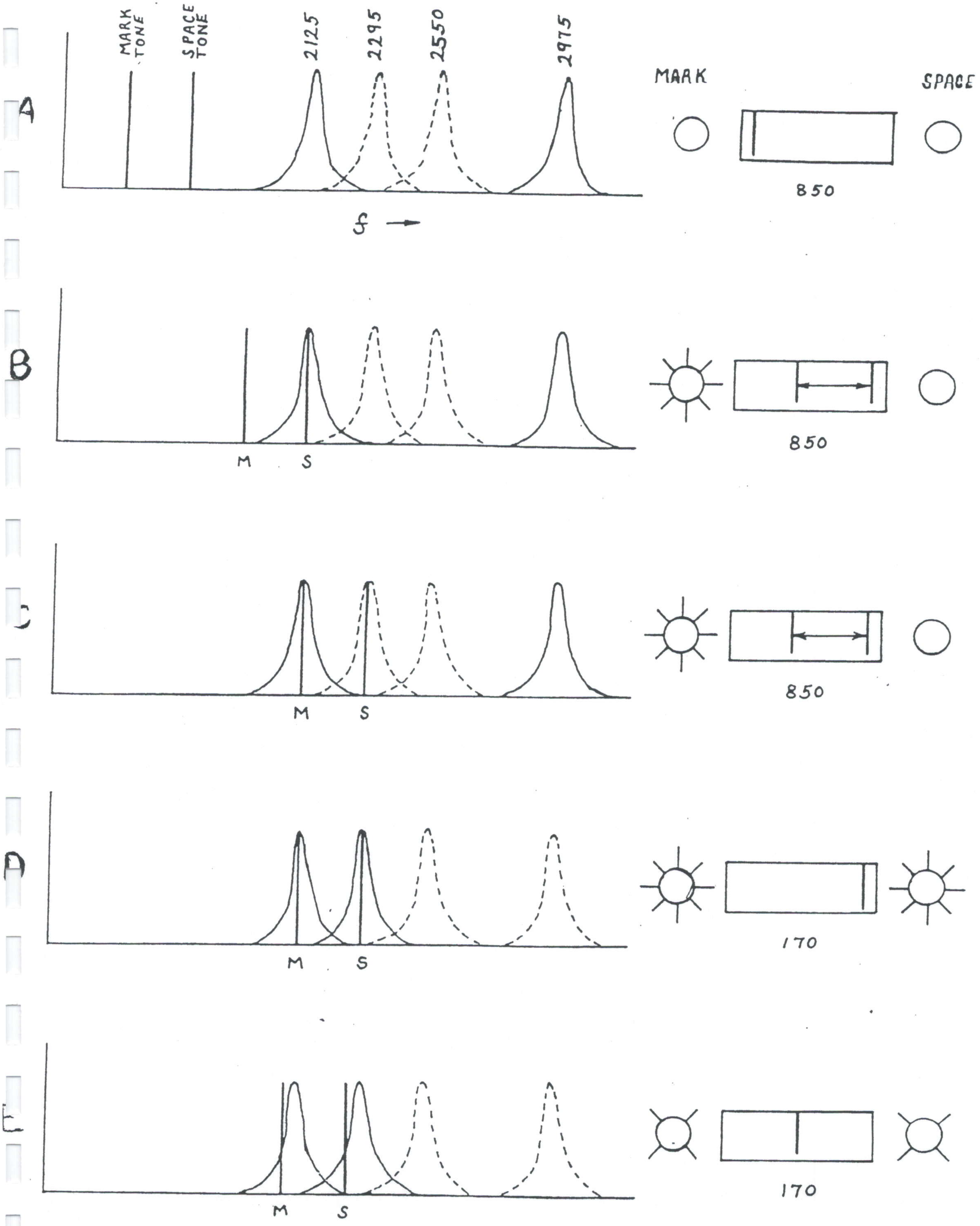

A
MARK TONE
SPACE TONE
2125
2295
2550
2975
MARK
SPACE
850
f →
B
M
S
850
C
M
S
850
D
M
S
170
E
M
S
170

Fig 11.

Autostart delay Selection:

Switch B7, & 8 selects the turn off delay of the autostart driver.

The actual delay in time is determined by the output baud rate selected, and the setting of these switches.

The chart below shows switch position of B7 and 8 for the relative times.

	B7	B8
Slowest	on	on
	on	off
	off	on
Fastest	off	off

Morse Speed Control Switches:

A portion of the Morse converter program contains a digital low-pass filter which determines the minimum input pulse width, either high or low, at the Morse input pin of the processor, that will be recognized as a valid input transition.

This minimum time interval determines the maximum noise pulse input width allowable without performance degradation, and also the maximum receiving speed.

The filter timing is set by the level on 4 of the processor control pins and are set by switches B-1 thru 4.

The compliment (opposite level) of the levels on these 4 pins are read by the processor as a binary number which is used as a scaling factor for the filter with the binary weighting shown in the following table:

Table A

	Switch #			
Wt	4	3	2	1
	8	4	2	1

To determine the minimum recognizable pulse width add the weight values for each switch that is "on", subtract 1, and multiply the results by the number obtained by the position of switches 5 and 6.

Table B

P (ms time)	Switch # 5	6
10	on	on
4	off	on
2	on	off
1	off	off

(1ms = .001sec)

Thus to compute the maximum speed and then the proper switch position use the following formula:

$$\text{speed (in wpm)} = \frac{.6}{T}$$

$$T = \frac{N \times P}{1{,}000}$$

N = Binary sum of switches 1 thru 4 (from table A)

P = Scaler in ms (from table B)

Example: switch settings	1	2	3	4	5	6
	on	on	on	off	on	off

T = 1 + 2 + 4 - 1 x .002

7 - 1 x .002

6 x .002

T = .012

speed = $\frac{.6}{.012}$ = 50 wpm.

Note; the M-200F is shipped with switches 1-6 set for 50 wpm.

Selection of hard copy output Mode:

Switch B-9 is the mode selection switch for the regenerated outputs (Loop A J3-8 J3-5, TTL J3-9, & RS232 J3-15). With switch B-9 in the "on" position the code from these regenerated outputs will be ASCII (8 level code). With switch B-9 in the "off" position the code from these outputs will be Baudot (5 level code).

Selection of the baud rate for regenerated outputs:

The M-200F features a crystal controlled baud rate clock for accurate, drift free clocking of external printers. These baud rates are user selectable by the use of dip switch A-1 through A-8. To properly set-up these switches you must first know the baud rate of the machine to which you are interfacing. After determining the machine's baud rate you should set switches A1 through A8 for that baud rate as shown in the table below:

	Switch Number							
Speed	1	2	3	4	5	6	7	8
45 baud (60 wpm)			X				X	
50 baud (66 wpm)			X			X	X	
57 baud (75 wpm)	X		X		X		X	
75 baud (100 wpm)	X	X	X					X
100 baud (132 wpm)		X			X			X
110 baud		X		X	X			X
300 baud	X		X			X	X	X

Note: "X" means switch is placed in "on" position.

Should you desire to check the output of the clock system for proper operation the proper frequency in baud should be measured at IC 10, pin 38.

Fig. 12

Alignment:

RTTY/ASCII Demodulator

The M-200F RTTY/ASCII demodulator can be aligned using a built-in crystal controlled tone generator (high tone set only) as follows:

1. Remove the video board (remove 4 ea 6-32X¼ nuts and lift off of connecting plug).
2. Attach a clip lead from TP"B" to the input jack on the rear panel.
3. Adjust switch A 1-8 position for the tone desired as per the following table:

Switch A positions (For alignment generator purposes only)

Output at TP"B"	1	2	3	4	5	6	7	8
2125		X	X					
2295	X		X			X		
2550			X	X	X			
2975				X			X	

"X" = on

4. Attach a scope or sensitive, high impedance, AC volt meter to the scope output J3-2.
   Inject 2125Hz from generator TPB to input jack
   Adjust R22 for maximum on meter or scope.
5. Attach scope or high impedance AC volt meter to the scope output J3-3.
   A. Inject 2295Hz from generator or TP"B" to input, adjust R31 for max.
   B. Inject 2550Hz from TP"B" or generator to input, adjust R34 for max.
   C. Inject 2975Hz from TP"B" or generator to input, adjust R37 for max.
6. Return switches of switch A to prior positions.

Morse Alignment:

With video board still removed, CW sel control fully CCW

A. Inject 1000Hz signal at input of M-200F
B. Using a scope connected to pin 8 of IC 2, tune R7 for maximum
C. In the event that your receiver will not produce a 1KC beat note but can produce a lower note. (for instance 750Hz):

Using the receiver as a generator with its 750Hz beat note being generated, hook the audio from the receiver to the input of the M-200F and with the scope connected as in B above, adjust the R7 for maximum.

This concludes the alignment.

Replace the video board, making sure all pins are inserted correctly in the socket at the rear of the board.

Re-Install the 4 nuts and replace the top.

Video Board Display Selection

The Info-Tech M-73 video board is the latest in our line of high quality video display generators.

By the use of a small dip switch, the user can select four different display formats, cursor appearance (on or off) and select the proper refresh rate for US or European monitors.

The switch in question is at the front edge of the video board (upper board in the M-200F).

A legend explaining the use of the switches is etched in the board to the left of the switches.

When changing the position of any switch be sure to push the "clear" button to initialize the video processor in its new mode.

J-3 Connections

Pin	Use
1	Morse aux.
2	Scope output "mark"
3	Scope output "space"
4	RTTY/ASCII aux.
5	Loop "A" negative
6	Auto-start output
7	Ground
8	Loop "A" positive
9	Regenerated TTL output
10	Ground
11	Loop "B" negative
12	TTL output from demodulator - (not converted or regenerated)
13	Audio to external 8 ohm speaker
14	Loop "B" positive
15	Regenerated RS-232 output

USING PRINTERS WITH THE M-200F:

Sooner or later, the user of a video converter will feel the need for a hard copy printer.

The 200F will drive either a Baudot (5 level) or ASCII (8 level) printer to give a hard copy output of the incoming code (Morse), Baudot, or ASCII).

Sources of these printers, at reasonable prices, then becomes a problem for the new user.

The following machines may be used directly with the M-200F:

ASCII Machines

Teletype Corp 33, 35, 37, 43
Heath H14 (to 110 baud only)
Epson MX80 using the 8150 serial interface
D.I.P. 81A (serial version)

Baudot Machines

Teletype Corp 15, 19, 26, 28, 32

All of the machines above are available in a RS 232 or current loop configuration which will interface directly with the 200F's serial outputs.

Other machines may be used with the M-200F but they still must be capable of being driven with the 200F's various serial interfaces and they must NOT require handshaking (handshaking is a signal sent from the printer, at the end of a line, that tells the sending device to stop sending during the period that the carriage or type head is being returned to the left hand side of the page).

The 200F does have a small buffer (40 characters) that will allow some storage of text during the carriage return, but this small buffer can be used up very quickly on a printer that is printing significantly slower than the incoming signal.

For instance, if you are attempting to copy a continuous stream of 110 Baud ASCII on a 100 wpm (74 Baud) model 28 teletype, the buffer will fill in approximately 64 seconds and all output after this point will be garble.

The very best printer tested for use with the M200F is the Teletype Corp Model 43, which is available in various configurations as to paper type and interface.

Printers of various types can be located through local amateur RTTY groups, computer stores, electronic & computer magazines, and Typetronics, Box 8873, Ft. Lauderdale, Florida 33310.

Note: Because of the many variations within the models of Teletype ® machines, we will be unable to give the user specific instructions on hookups.

ADDENDUM 1

VIDEO MONITOR SELECTION

The video display module used in the 200-F utilizes approximately 85% of the total vertical scan for active video display information. Most televisions, or video monitors intended for CCTV applications, are shipped from the factory with 20% or more vertical overscan. The vertical height and/or linearity should be adjusted so that the top and bottom lines of the display are both completely visible and all lines of characters are of equal height. Refer to the operating or service manual of the display unit for information on performing these adjustments.

Experience has shown that the Sanyo VM4092, VM4209, VM4215, Javelin VM9C, VM15, and Ball Brothers 12" units are completely adequate for use with the 200-F. Other models of video monitors (RCA, Panasonic, Sanyo VM4509, VM4512) do not perform as well on the 72x25 display although they are adequate for the 32x16 display.

The most important criteria, in a video monitor, for these purposes are the bandwidth and resolutions on the edges. It would be safe to say that any good quality monitor with 12MHZ bandwidth and a 90 deflection C.R.T. will give you a good picture.

Occasionally, surplus, high quality video monitors become available at very reasonable prices.

Sources of new, and used video monitors are usually advertised in various electronic and computer periodicals available at your local newstand.

CONVERSION OF TELEVISION SETS FOR USE AS VIDEO MONITORS

The following is a brief general outline of the steps required to convert a standard black and white television receiver for use to display a composite video signal. The description given and schematics shown are typical examples of television receivers and are not intended to be specific instructions for any particular receiver.

The first and most important requirement is that the television to be converted MUST be transformer isolated from the AC power line. Some solid state televisions having power transformers or autocoils do not have their chassis isolated from the AC line. Check the schematic throughly before starting.

The second prerequisite for the modification is an accurate schematic of the receiver to be converted. Check the similarity of the receiver's video detector and amplifier stages to those shown. If there are significant differences, these instructions may not be applicable to that receiver. Take careful note of the polarity of the detected video signal (the cathode of the video detector diode must connect to the last 1F transformer). If there is a difference in the polarity of the detected video signal the conversion shown here will yield unacceptance results.

The schematics shown assume that the television is intended to be used as a normal receiver as well as a monitor, so all existing circuitry has been left intact, and any necessary biasing circuits have been duplicated. If video monitor use only is desired, the existing circuitry may be removed or modified and the selecting switch may be eliminated. If the switches are used, the interconnecting leads should be kept as short as possible.

These instructions give a general overview of the minimum required modifications for television conversion. Parameters other than signal insertion and video bias level will affect the quality of the video display, amoung these are video bandwidth and sync stability. Due to the vast number of different television receivers, it is not within the scope of these instructions to give any information on improving any of these parameters.

Info-Tech assumes no responsibility for the use of any information contained herein. It is the responsibility of the user to determine the suitability of any receiver and any modifications for their application. Due to the number and variety of the televisions available, Info-Tech will not be able to provide any other or more detailed information on the conversion of any particular make or model of television receiver.

SOLID STATE RECEIVERS:

Set the receivers tuner between channels so that there is a white, snowfree raster. Referring to Figure 13A and the receiver schematic, measure the voltage at the base of Q1 and take note of this value. Modify the circuit as shown in Figure 13B with Rb=R2, Ca=47mfd, Da=IN914 or equivalent. Select the value for Ra that produces a bias level 1.5 to 2.0 volts lower than that noted prior to modification at the base of Q1, with the switch in the 'video' position.

TUBE RECEIVERS:

Set the receivers tuner between channels so that there is a white, snowfree raster. Referring to Figure 13C and the receiver schematic, measure the voltage at the cathode of V1 and take note of this voltage. Modify the circuit as shown in Figure 13D Ca=100uf, Da=IN914 or equivalent. In some receivers the cathode of VI will have no resistor to ground (R2=0 ohm). In these cases, the ground connection to the cathode (and cathode only) must be broken. Select the value for RA that produces a cathode voltage 1.5 to 2.0 volts higher than that noted prior to modification.

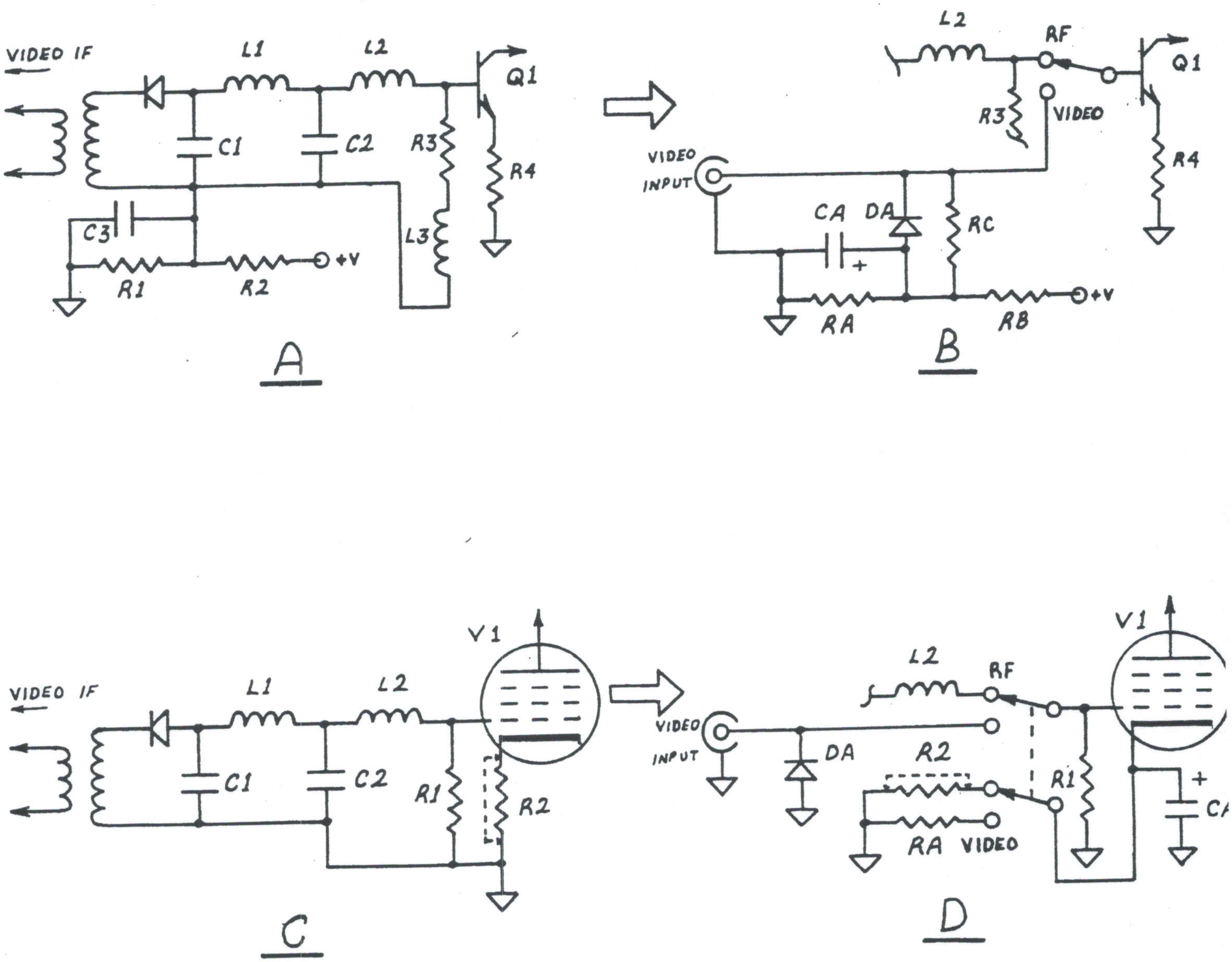

VIDEO IF
L1
L2
Q1
C1
C2
R3
R4
C3
L3
+V
R1
R2
A
L2
RF
Q1
R3
VIDEO
R4
VIDEO INPUT
CA
DA
RC
+
+V
RA
RB
B
V1
VIDEO IF
L1
L2
C1
C2
R1
R2
C
L2
RF
V1
VIDEO INPUT
DA
R2
R1
+
RA
VIDEO
D

FIG 13

Addendum # 2
Use of the M-200F on 300 Baud ASCII

The demodulator in the M200F is optimized for 45 to 110 baud operation and because of this the performance of the M200F on 300 baud ASCII, when using the built in demodulator, leaves much to be desired.

There are two solutions to this problem:

1. Use an outboard demodulator specially designed for the higher baud rates. (An auxilliary digital input has been provided for this purpose.)
2. Modify the built-in demodulator for use at higher baud rates as shown below. (This modification will greatly diminish the performance of the unit at the lower baud rates).

Modification of Demodulator for high baud rate operation.

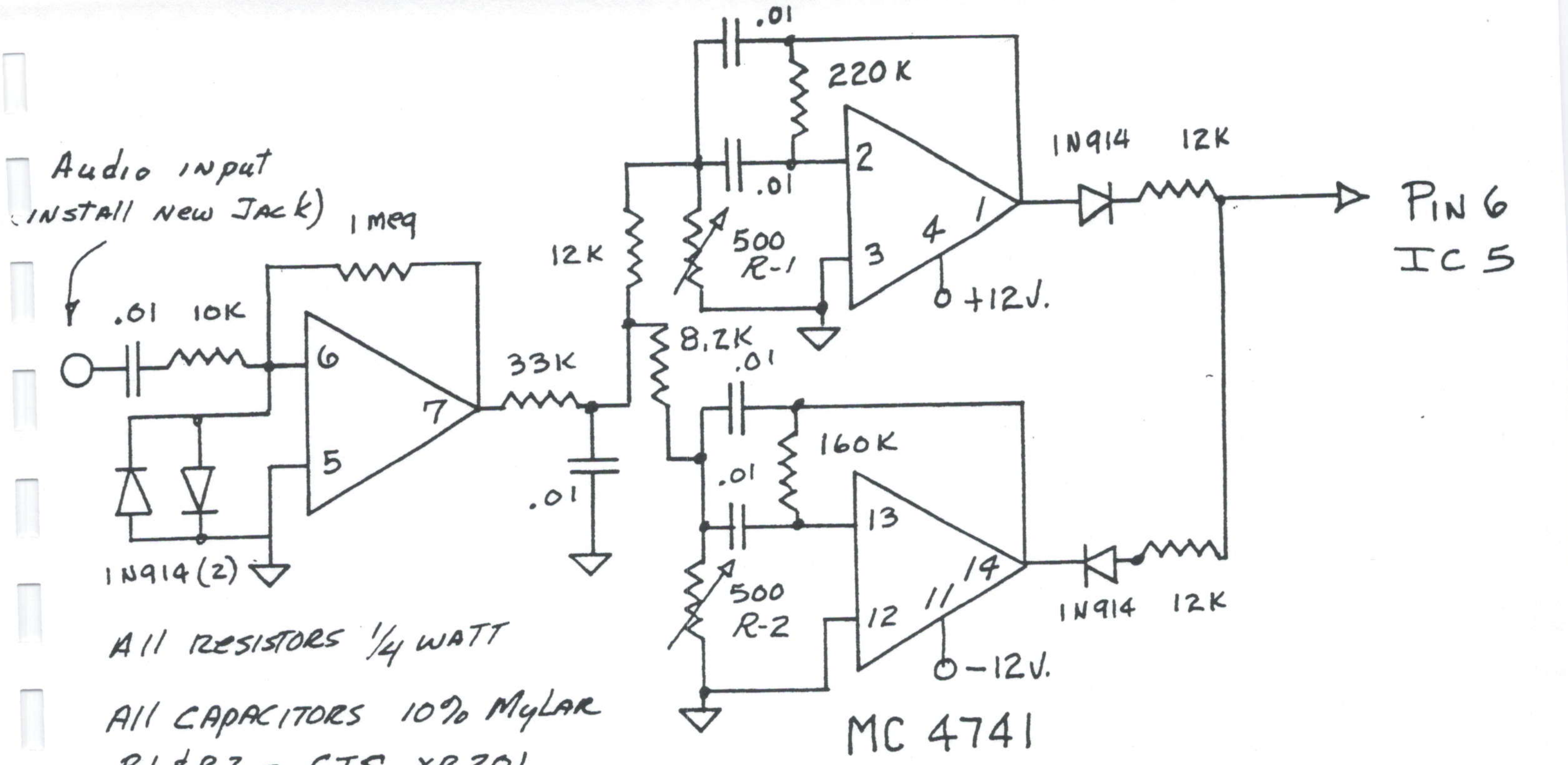
1. Remove R26.
2. Parallel R25 with a 68k ¼w resistor.
3. Remove R-44.
4. Parallel R 42 with a 68k ¼w resistor.
5. Change C 19 to .01 disc.

end of modification

Addendum # 3
Minimizing RFI from the M200F

The M200F utilizes two microprocessors and two separate crystal oscillators in its operation and thus will be generating quite a bit of very low level radio frequency energy.
With todays very sensative receivers it is very easy to "hear" the M200F unless some simple precautions are taken.

1. Always use the 200F with a good, grounded power system.
2. Use double shielded coax on the video line and keep the line as short as possible.
3. Use shielded leads on all other input and accessory lines.
4. Keep the receiving antenna at least 50' away from the M200F and use a good grade of coax as a feed line from the antenna.



All resistors 1/4 WATT

All CAPACITORS 10% MyLAR

R1 & R2 - CTS XR201

ALignment:

A. inject 2125 hz. Adjust R-1 for MAX on scope at pin 1 of 4741

B inject 2975 hz At input Adjust R-2 for MAX on scope at pin 14 of 4.

Power for circuit can be Taken from M-200F supply.

Fig 14. 300 Baud demodulator frontend For M-200F

This schematic of a simple, but effective, high baud rate demodulator is provided for those operators who prefer not to modify the internal demodulator As provided in addendum #2

INFO-TECH

M-200F Application Memo

Regenerated Serial Output

It has come to our attention that a number of people are using the regenerated serial output to drive printers set up for the same speed as that being received (100 wpm). As will be described below, this type of operation can cause errors on continuous data streams (tape sent data, such as pictures). It was originally intended for that type of operation (printer and received speed the same) be implemented using the non-regenerated output.

In order to maintain universal compatibility, the 200-F must be able to receive and properly decode Baudot signals having one stop bit, or any stop length greater than one bit. To maintain compatibility with the vast number of printers available, the serial output generates two stop bits.

Many printers use a 1.42 unit stop bit, resulting in a 7.42 unit character. At 75 baud (13.33 ms/bit) it takes 98.9 ms to send a 7.42 unit character. To regenerate that same character (at 75 baud) with 8 bits (2 stop bits) it takes 106.6 ms.

With characters coming in faster than they can be regenerated, the difference begins to fill the 40 character buffer. When a steady stream of characters are received, it is only a matter of time before the buffer becomes full, resulting in intermittent lost characters.

To alleviate this problem, the baud rate for the regenerated output must be increased to a point where the time required to regenerate a character is the same as or less than that required to receive that character (98.9 ms). An eight unit character sent at 81 baud takes 98.8 ms.

Operating a printer, intended for 75 baud, at 81 baud will require adjustment of the range selector on that printer for proper operation. We have operated several Model 28 printers geared for 75 baud at 87 baud with no modification except for adjustments to the range selector with excellent results.

There is a setting of the baud selector switches which will provide 81.5 baud, which should provide proper operation in most cases.

The switch setting is: 8 and 6 ON, all others OFF.

M200F Series 2 Production Change

Effective with s/n 3037

THIS ONE
3220

○

R21	220K	¼w	5%
R24, 25	221K	¼w	1%
R27	402K	¼w	1%
R26	205K	¼w	1%
R29	200K	¼w	5%
R32, 38	180K	¼w	5%
R35	120K	¼w	5%
R41, 42	182K	¼w	1%
R43	340K	¼w	1%
R44	174K	¼w	1%
R 5	22K	¼w	5%
R51	180K		
C9	.01 Mylar		

ERATTA

Parts List corrections effective with M 200F S/N 3001

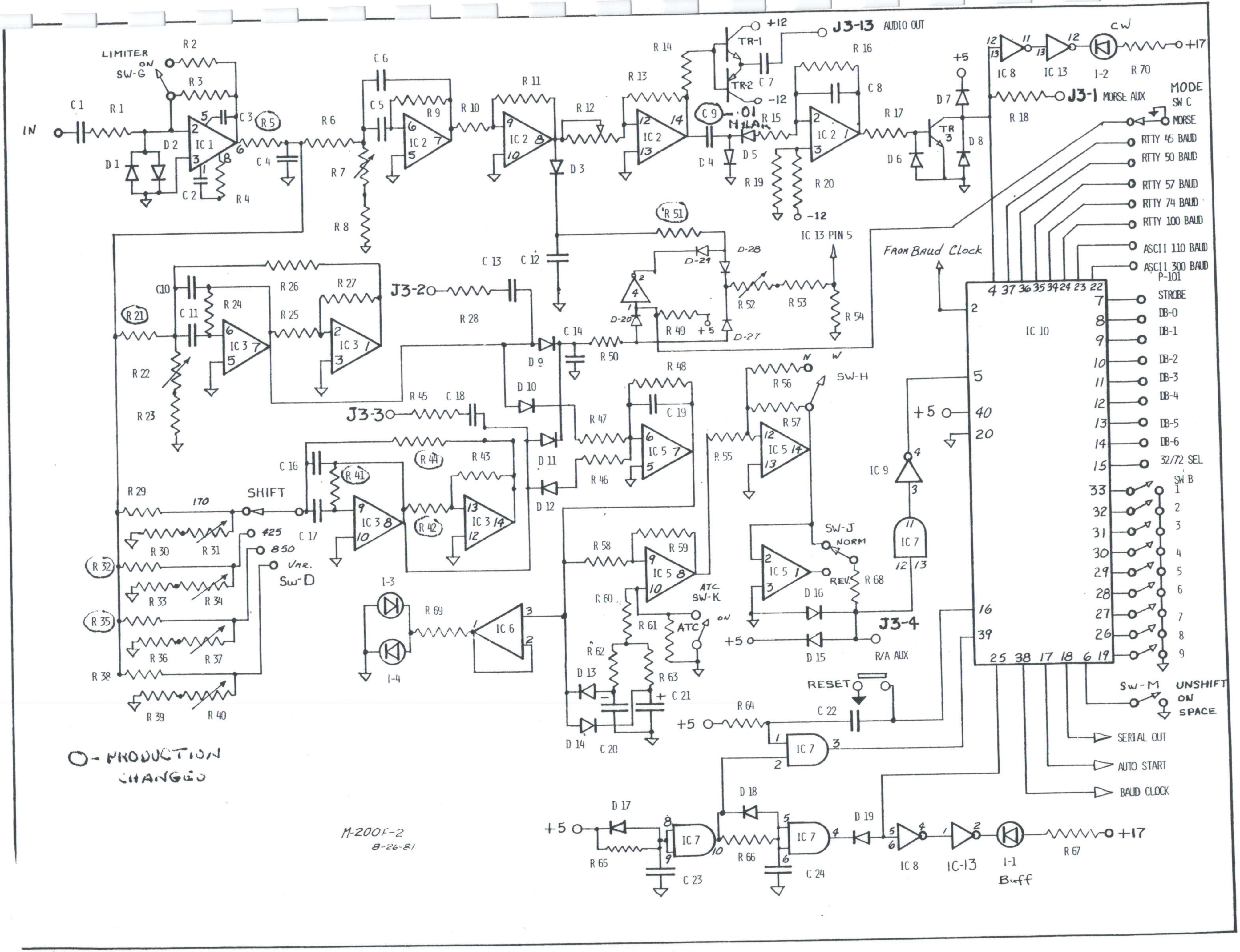
	Was	Change to:
R5	33K	22K ✓
R21	180K	220K ✓
R32	160K	180K ✓
R35	130K	100K ✓
R41,42,44	160K	180K ✓
C9	.1 disc.	.01 mylar ✓
R51	22K	180K ✓

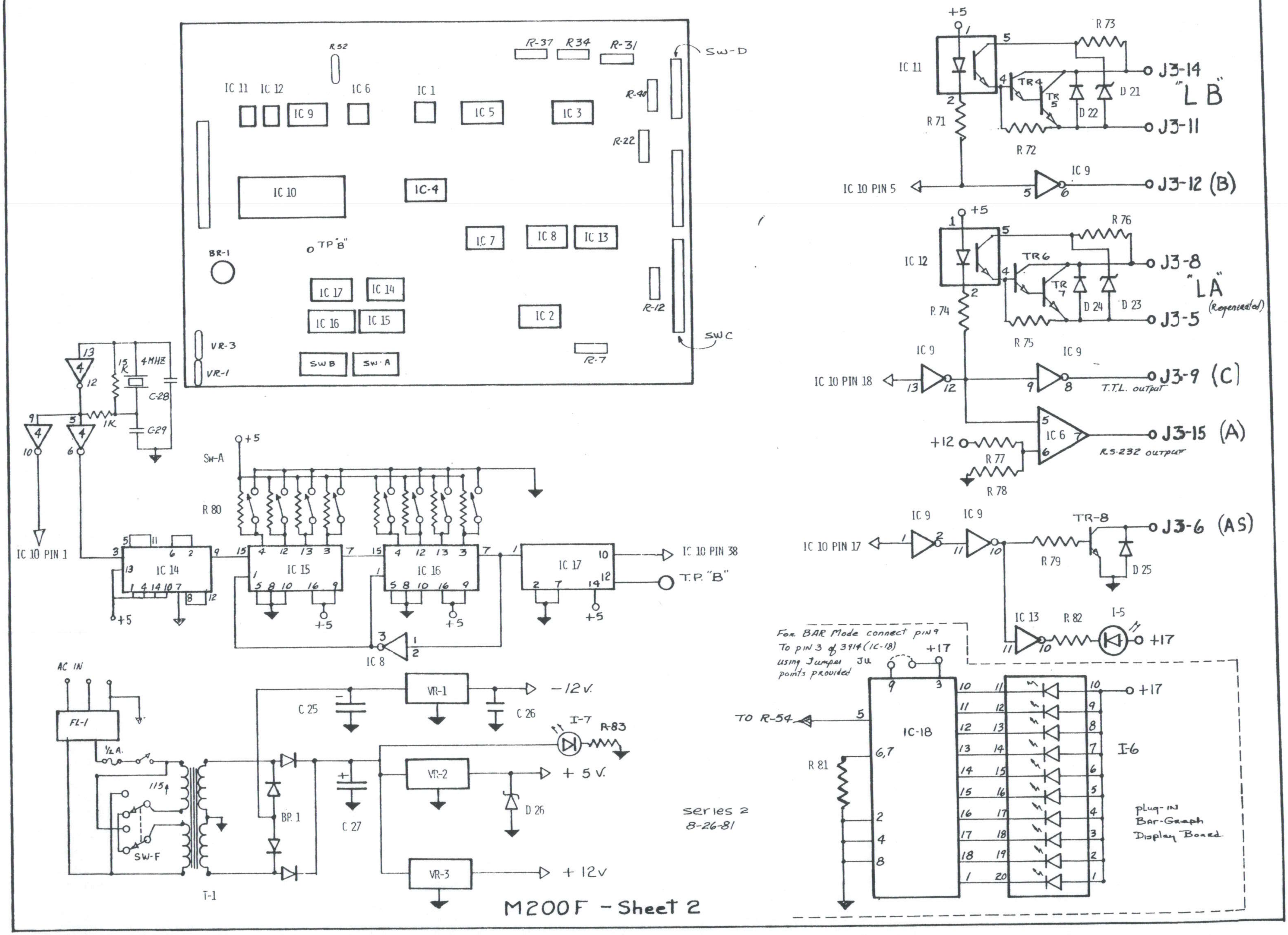
PARTS LIST M-200F LOGIC BOARD

R23, 30	270k	¼w 5%
R35	130k — 100 K	¼w 5%
R1,8,70,81,82,83,67	1k	¼w 5%
R2,28,45,16,56,57,62,63	100k	¼w 5%
R3	1 meg	¼w 5%
R4	1.2k	¼w 5%
R5, 77	33k — 22 K	¼w 5%
R6	82k	¼w 5%
R7	500 ohm trimmer	¼w 5%
R9, 21, 24, 25, 38	180k — 220 K	¼w 5%
R10	110k	¼w 5%
R11	220k	¼w 5%
R12	10k part of switch C	
R51, 55, 68	22k — 180 K	¼w 5%
R14, 16,17,19,20,46,47,49,50,58,59,60,64,65,78,13	12k	¼w 5%
R15,71,74,79	4.7k	¼w 5%
R18, 69	470	¼w 5%
R22, 31, 34, 37, 40	150 ohm trimmer	¼w 5%
R33, 39	200	¼w 5%
R26, 29	200k	¼w 5%
R53, 66	270k	¼w 5%
R36	150 ohm	¼w 5%
R43, 27	360k	¼w 5%
R54, 72, 75	47k	¼w 5%
R52	100k trimmer	¼w 5%
R61	68k	¼w 5%
R73, 76	33k	½w 5%
R80	10k resistor Network	
R41, 42, 44, 32	160k — 180 K	¼w 5%
R43	300k	¼w 5%
R48	75k	¼w 5%
C-1	.1 disc	
C-2	78 pf mica	
C-3	5 pf mica	
C-4,5,6,10,11,16,17	.01 mfd mylar	
C-7	100 mfd electrolytic	
C-8, 22	.01 mfd disc 100v	
C-28, 29	15 pf disc 300v	
C-9, 13, 14, 18	.1 disc 50v	
C-12	1 mfd 25v electrolytic	
C-19	.022 mylar	
C-20, 21	15 mfd 20v electrolytic	
C-23, 24, 26	4.7 mfd 20v tantalum	
C-25, 27	1000 mfd 25v electrolytic	
D-1 thru D-19, D-27 thru D-29	IN914	
D-21, 23, 26	IN4736A zenor	
D-22, 24, 25	IN4004	
BR-1	1 amp bridge (GIW02M)	

I-1,2,3,4,5,7	MV57124 (G.I.)
I-6	MV57164 (G.I.)
input & video jack	Switchcraft 3501 FR
J-3	Cinch S315AB

IC1	709TC	IC10	3870	TR1,3	MPS5172
2,3,5	LM348	11,12	4N28	TR2	MPS3638A
4	4069	13	7406	TR4-8	MPSA42
6	1458	14	74LS74	VR-1	7912UC
7	4081	15,16	4029B	VR-2	LM309K
8	4011	17	4024B	VR-3	7812UC
9	7404	18	LM3914N	T-1 Signal	DP241-6-24
FL1	CORCOM 1B4				


IN
LIMITER ON SW-G
C 1
R 1
R 2
R 3
D 1
D 2
IC 1
C 2
C 3
R 4
R 5
C 4
R 6
R 7
R 8
C 5
C 6
R 9
IC 2
R 10
R 11
D 3
R 12
R 13
R 14
TR-1
TR-2
+12
-12
C 7
C 9
.01 MYLAR
D 4
D 5
R 15
R 19
R 20
R 16
C 8
R 17
J3-13 AUDIO OUT
TR 3
D 6
D 7
D 8
+5
IC 8
IC 13
I-2
CW
R 70
+17
R 18
J3-1 MORSE AUX
MODE SW C
MORSE
RTTY 45 BAUD
RTTY 50 BAUD
RTTY 57 BAUD
RTTY 74 BAUD
RTTY 100 BAUD
ASCII 110 BAUD
ASCII 300 BAUD
P-101
FROM Baud Clock
IC 10
STROBE
DB-0
DB-1
DB-2
DB-3
DB-4
DB-5
DB-6
32/72 SEL
SW B
C 12
C 13
R 51
D-28
D-29
D-20
D-27
R 49
R 52
R 53
R 54
IC 13 PIN 5
C10
C 11
R 21
R 22
R 23
R 24
R 25
R 26
R 27
IC 3
J3-2
R 28
C 14
D 9
R 50
D 10
D 11
D 12
J3-3
R 45
C 18
R 47
R 46
R 48
C 19
IC 5
R 55
R 56
R 57
N
W
SW-H
C 16
C 17
R 41
R 44
R 43
R 42
SHIFT
170
425
850
VAR.
SW-D
R 29
R 30
R 31
R 32
R 33
R 34
R 35
R 36
R 37
R 38
R 39
R 40
I-3
I-4
R 69
IC 6
R 58
R 59
R 60
R 61
R 62
R 63
ATC SW-K
ATC
ON
D 13
D 14
C 20
C 21
SW-J
NORM
REV.
R 68
D 16
D 15
J3-4
R/A AUX
IC 9
IC 7
RESET
C 22
R 64
SW-M
UNSHIFT ON SPACE
SERIAL OUT
AUTO START
BAUD CLOCK
D 17
D 18
D 19
R 65
R 66
C 23
C 24
IC-13
I-1
Buff
R 67
O-PRODUCTION CHANGES
M-200F-2
8-26-81

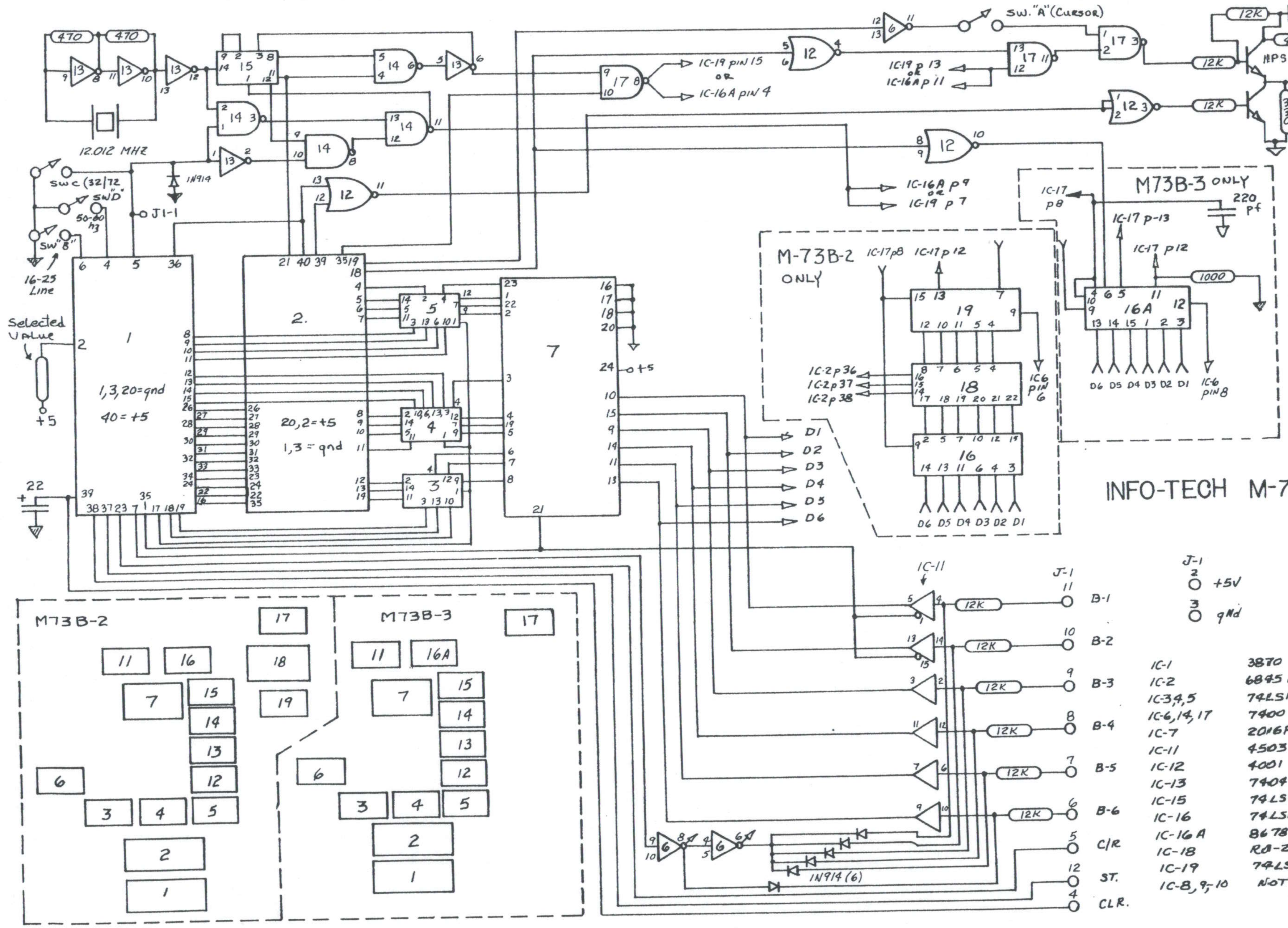


For BAR Mode connect pin 9 To pin 3 of 3914 (IC-18) using Jumper JU points provided

plug-in Bar-Graph Display Board

Series 2
8-26-81

M200F - Sheet 2



INFO-TECH M-73B-2 & B3

10-6-81 K

IC-1	3870
IC-2	6845 or HD46505RP
IC-3,4,5	74LS157
IC-6,14,17	7400
IC-7	2016P-1 Hitachi
IC-11	4503
IC-12	4001
IC-13	7404
IC-15	74LS93
IC-16	74LS174
IC-16A	8678 or 8656 4CAB (NS
IC-18	RO-2513 (G-I)
IC-19	74LS166
IC-8, 9, 10	NOT USED